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Dear Dr Jennifer Jackson,

I would like to take this opportunity to thank the Board of Antarctic Science Ltd for awarding me the 2019 Antarctic Science Bursary. With your support, I have received funding to take my Antarctic permafrost samples to the ETH Laboratory of Ion Beam Physics in Zurich, in November 2019.

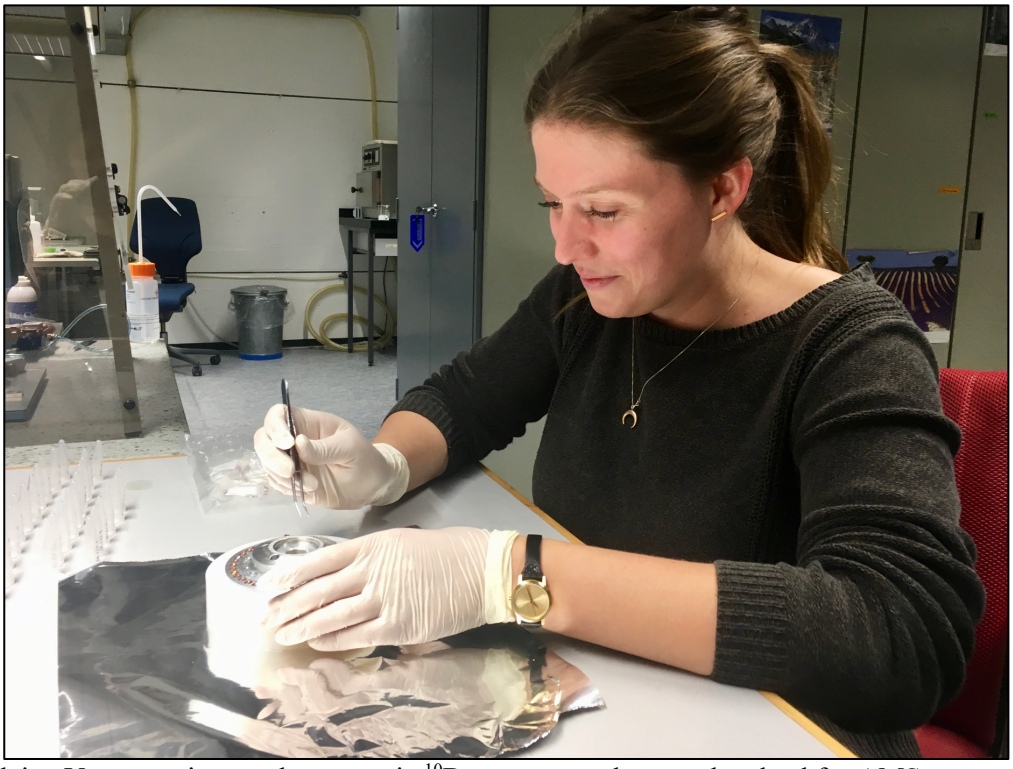
I am a third-year doctoral student at the Antarctic Research Centre, under the supervision of Dr. Warren Dickinson and Dr. Kevin Norton. My project aims to understand the unique geochemical characteristics of the permafrost cores retrieved during the 2016 Friis Hills Drilling Project. One of the objectives of my project is to to constrain the timing of formation of the ground ice, using meteoric ^{10}Be as a tracer for water infiltration.

When visiting ETH Zurich, I had the chance to see first-hand how Accelerator Mass Spectrometry (AMS) technology operates and obtain guidance from a worldwide leading group of scientists. My visit happened to coincide with the inauguration of new system, the MILEA system (https://www.ionplus.ch/milea). Since my samples were the first to test the new system, the operators allowed my samples to run until they reached the maximum precision of the instrument. I therefore obtained results with extraordinary precision which will allow me to draw very interesting conclusions about the onset of permanent aridity in the upper elevations of the McMurdo Dry Valleys.

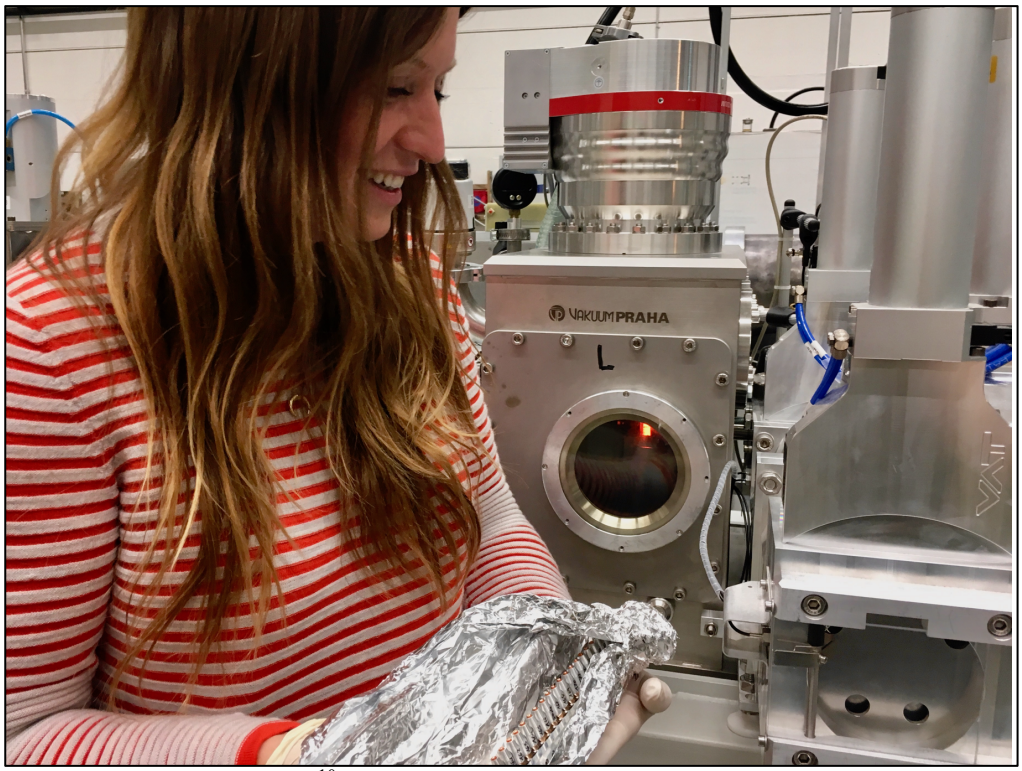
I attached to this letter photos taken during my visit to the ETH Laboratory of Ion Beam Physics in Zurich. I also included to this document, an abstract I submitted to the SCAR2020 conference, which took place virtually in August 2020. My abstract will be included to the Abstract Book which will be published form the cancelled meeting.

I plan on writing a paper on the meteoric ^{10}Be results in the coming months. In the meantime, I just submitted a paper on the cryostratigraphy of the Friis Hills Drilling Project cores to *Antarctic Science* to show my gratitude towards the Board of Antarctic Science Ltd for awarding me the 2019 Antarctic Science Bursary. This experience would not have been possible without the generous contribution of Antarctic Science Ltd. I truly think this award creates unique opportunities for young researchers like me to take their research to a higher level.

Sincerely,
Marjolaine Verret
PhD Candidate in Permafrost Geochemistry



Marjolaine Verret setting-up the meteoric ^{10}Be targets on the sample wheel for AMS measurement



Marjolaine Verret holding meteoric ^{10}Be targets ready to be measured by the new MILEA system at ETH Zurich

Marjolaine Verret looking at the preliminary results coming out of the MILEA system

PRESENCE OF $^{10}Be_{met}$ IN MIOCENE SEDIMENTS CHALLENGES PERMANENT POLAR ARIDITY IN THE MCMURDO DRY VALLEYS

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Many studies suggest that at high elevations, the McMurdo Dry Valleys have remained frozen under a hyper-arid polar climate since ~12.9 Ma. Ground ice is ubiquitous in subsurface sediments at these elevations, and its presence in sediments dating back to the Mid-Miocene (~14 Ma) is at the center of the debate regarding the onset of permanent aridity. Recent studies using $^{10}Be_{met}$ as a tracer for water infiltration in two nearby high elevations sites yield conflicting results. Dickinson et al. (2012) found significant $^{10}Be_{met}$ concentrations down to 4.5 m at Table Mt. (77°57'S, 161°57'E, 1945 m a.s.l) suggesting infiltration of liquid water during warmer periods well after 12.9 Ma, whereas Valletta et al. (2015) did not detect $^{10}Be_{met}$ within 60 cm at Friis Hills (77°45′S, 161°30′E, 1200 – 1500 m a.s.l), supporting persistent polar aridity and opening up a debate on $^{10}Be_{met}$ leaching methods. Here, we investigated both sites using the same leaching method as Valletta et al. (2015), measuring $^{10}Be_{met}$ in a 5 m core at Friis Hills and samples from the Dickinson et al. (2012) study at Table Mt. Our results show that $^{10}Be_{met}$ is present down to a depth of 5 m at both sites, in concentrations 2 – 4 orders of magnitude greater than those found by Valletta et al. (2015). These findings show that water infiltration occurred after the emplacement of the sediment, indicating warm and wet periods through the late-Miocene and Pliocene; findings which are supported by the isotopic signature of the near-surface ground ice.